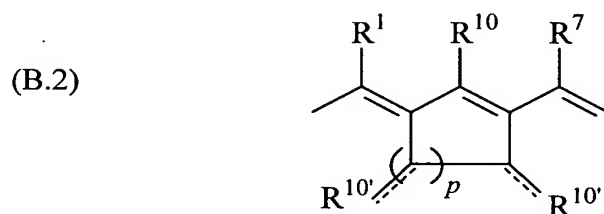
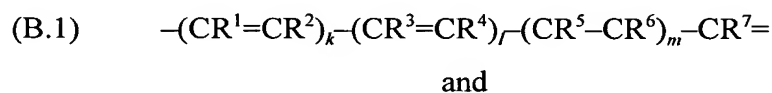


We Claim:

1. A mobility-modifying cyanine dye comprising: (i) a first substituted or unsubstituted parent heteroaromatic benzazole/benzazolium ring system having a linking moiety of the formula $-L-LG$, where L is a linker and LG is a linking group, attached to the heteroaromatic ring nitrogen; (ii) a second substituted or unsubstituted parent heteroaromatic benzazole/benzazolium ring system having a mobility-modifying moiety attached to the heteroaromatic ring nitrogen; and an electron delocalizing bridge connecting the first and second parent benzazole/benzazolium rings *via* their respective C2 carbons, wherein when said mobility-modifying moiety has a net charge of -2 or less or +1 or greater.

2. The mobility-modifying cyanine dye of Claim 1 in which the bridge is a compound selected from the group consisting of:



wherein:

k , l , and m are each independently integers from 0 to 1;

R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and R^7 are each independently selected from the group consisting of hydrogen, halogen, $-F$, $-Cl$, $-CN$, $-CF_3$, (C_1-C_6) alkyl, (C_5-C_{14}) aryl or 5-14 membered heteroaryl;

R^{10} and $R^{10'}$ are each independently selected from the group consisting of hydrogen, oxygen, halogen, -F, -Cl, -CN, -CF₃, -OR, -SR, -NRR, (C₁-C₆) alkyl, (C₅-C₁₄) aryl or 5-14 membered heteroaryl, where each R is independently hydrogen or (C₁-C₆) alkyl; and

p is an integer from 0 to 2, where in structural formula (B.2), the dotted lines at substituents $R^{10'}$ represent bonds that may be independently either single bonds or a double bonds, depending upon the identities of the substituents.

3. The mobility-modifying cyanine dye of Claim 2 in which the bridge is a compound of structural formula (B.1).

4. The mobility-modifying cyanine dye of Claim 3 in which the sum of k , l and m is 2.

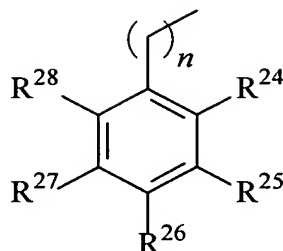
5. The mobility-modifying cyanine dye of Claim 2 in which the bridge is a compound of structural formula (B.1) wherein R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and R^7 are each hydrogen.

6. The mobility-modifying cyanine dye of Claim 1 in which the bridge is $-\text{CH}=\text{CH}-\text{CH}=\text{CH}-\text{CH}=\text{}$.

7. The mobility-modifying cyanine dye of Claim 1 in which the mobility-modifying moiety has a net positive charge.

8. The mobility-modifying cyanine dye of Claim 1 in which the mobility-modifying moiety has a net negative charge.

9. The mobility-modifying cyanine dye of Claim 1 in which the mobility-modifying moiety has the structure:



or a salt thereof, wherein:

5 n is an integer from 1 to 6 (preferably 1 to 3);

R^{24} , when taken alone, is hydrogen, a strong anionic substituent, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$, or when taken together with R^{25} is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$ groups;

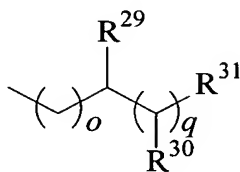
10 R^{25} , when taken alone, is hydrogen, a strong anionic substituent, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$, or when taken together with R^{24} or R^{26} is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$ groups;

15 R^{26} , when taken alone, is hydrogen, a strong anionic substituent, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$, or when taken together with R^{25} or R^{27} is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$ groups; and

20 R^{27} , when taken alone, is hydrogen, a strong anionic substituent, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$, or when taken together with R^{26} or R^{28} is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$ groups; and

25 R^{28} , when taken alone, is hydrogen, a strong anionic substituent, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$, or when taken together with R^{27} is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, $-\text{S}(\text{O})_2\text{O}^-$, or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$ groups.

10. The mobility-modifying cyanine dye of Claim 1 in which the mobility-modifying moiety has the structure:



or a salt thereof, wherein:

o is an integer from 1 to 3;

q is an integer from 1 to 3;

R^{29} is a strong anionic substituent, $-\text{S}(\text{O})_2\text{O}^-$ or $-\text{O}-\text{S}(\text{O})_2\text{O}^-$,

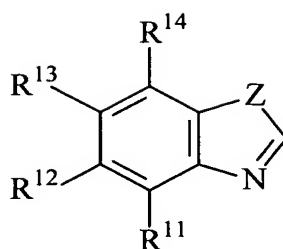
each R^{30} is independently selected from the group consisting of hydrogen a strong anionic substituent, $-\text{S}(\text{O})_2\text{O}^-$ and $-\text{O}-\text{S}(\text{O})_2\text{O}^-$; and

R^{31} is selected from the group consisting of hydrogen, a strong anionic substituent, $-\text{S}(\text{O})_2\text{O}^-$, $-\text{O}-\text{S}(\text{O})_2\text{O}^-$ and $-\text{CH}_3$,

with the proviso that MM has a net charge of at least -2 at a pH in the range of about pH 6 to pH 10.

11. The mobility-modifying cyanine dye of Claim 1 in which the first and second heteroaromatic benzazole/benzazolium ring systems are the same.

12. The mobility-modifying cyanine dye of Claim 1 in which the first parent heteroaromatic benzazole/benzazolium ring system has the structure:



or a salt thereof, wherein:

Z is selected from the group consisting of -S-, -O-, -Se- and -CR⁸R⁹-, where R⁸ and R⁹ when taken alone, are each independently (C₁-C₆) alkyl, or when taken together are (C₄-C₅) alkylene or (C₄-C₅) alkanone;

R¹¹, R¹², R¹³ and R¹⁴, when taken alone, are each independently selected from the group consisting of hydrogen, (C₁-C₆) alkyl, (C₁-C₆) alkyl independently substituted with one or more W, 2-6 membered heteroalkyl, 2-6 membered heteroalkyl independently substituted with one or more W, (C₅-C₁₀) aryl, (C₅-C₁₀) aryl independently substituted with one or more W, (C₅-C₆) arylaryl, (C₅-C₆) arylaryl independently substituted with one or more W, (C₆-C₁₆) arylalkyl, (C₆-C₁₆) independently substituted with one or more W, 6-16 membered arylheteroalkyl, 6-16 membered arylheteroalkyl independently substituted with one or more W, 5-10 membered heteroaryl, 5-10 membered heteroaryl independently substituted with one or more W, 5-6 membered heteroaryl-heteroaryl, 5-6 membered heteroaryl independently substituted with one or more W, 6-16 membered heteroarylalkyl, 6-16 membered heteroarylalkyl independently substituted with one or more W, 6-16 membered heteroaryl-heteroalkyl and 6-16 membered heteroaryl-heteroalkyl independently substituted with one or more W,

or when taken together with an adjacent Rⁿ are each independently selected from the group consisting of (C₆-C₁₀) arylene, (C₆-C₁₀) arylene independently substituted with one or more W, 6-10 membered heteroarylene and 6-10 membered heteroarylene independently substituted with one or more W; and

each W is independently -R, -X, =O, -OR, =S, -SR, -NRR, =NR, (C₁-C₆)

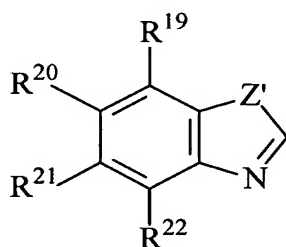
perhaloalkyl, $-CX_3$, $-CN$, $-OCN$, $-SCN$, $-NO$, $-NO_2$, $=N_2$, $-N_3$, $-NHOH$, $-S(O)_2R$, $-C(O)R$, $-C(S)R$, $-C(O)OR'$, $-C(S)OR'$, $-C(O)SR'$, $-C(S)SR'$, and $-C(NR)NRR$, wherein:

each X is independently a halogen;

each R is independently $-H$, $-NR''R''$, $-C(O)R''$, $-S(O)_2R''$, (C_1-C_6) alkyl, (C_1-C_6) alkanyl, (C_2-C_6) alkenyl, (C_2-C_6) alkynyl, (C_5-C_{10}) aryl, (C_6-C_{16}) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and

each R' is independently (C_1-C_6) alkyl, (C_1-C_6) alkanyl, (C_2-C_6) alkenyl and (C_2-C_6) alkynyl, (C_5-C_{10}) aryl, (C_6-C_{16}) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and each R'' is independently $-H$, (C_1-C_6) alkyl, (C_1-C_6) alkanyl, (C_2-C_6) alkynyl, (C_5-C_{10}) aryl, (C_6-C_{16}) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl.

13. The mobility-modifying cyanine dye of Claim 1 in which the second parent heteroaromatic benzazole/benzazolium ring system has the structure:



or a salt thereof, wherein:

Z' is selected from the group consisting of $-S-$, $-O-$, $-Se-$ and $-CR^8R^9$, where R^8 and R^9 , when taken alone, are each independently (C_1-C_6) alkyl, or when taken together are (C_4-C_5) alkyleno or (C_4-C_5) alkano;

R^{19} , R^{20} , R^{21} and R^{22} , when taken alone, are each independently selected from the group consisting of hydrogen, (C_1-C_6) alkyl, (C_1-C_6) alkyl independently substituted with one or more W, 2-6 membered heteroalkyl, 2-6 membered heteroalkyl

independently substituted with one or more W, (C₅-C₁₀) aryl, (C₅-C₁₀) aryl independently substituted with one or more W, (C₅-C₆) arylaryl, (C₅-C₆) arylaryl independently substituted with one or more W, (C₆-C₁₆) arylalkyl, (C₆-C₁₆) independently substituted with one or more W, 6-16 membered arylheteroalkyl, 6-16 membered arylheteroalkyl
5 independently substituted with one or more W, 5-10 membered heteroaryl, 5-10 membered heteroaryl independently substituted with one or more W, 5-6 membered heteroaryl-heteroaryl, 5-6 membered heteroaryl independently substituted with one or more W, 6-16 membered heteroarylalkyl, 6-16 membered heteroarylalkyl independently substituted with one or more W, 6-16 membered heteroaryl-heteroalkyl and 6-16 membered heteroaryl-heteroalkyl independently substituted with one or more W,

or when taken together with an adjacent Rⁿ are each independently selected from the group consisting of (C₆-C₁₀) arylene, (C₆-C₁₀) arylene independently substituted with one or more W, 6-10 membered heteroarylene and 6-10 membered heteroarylene independently substituted with one or more W; and

15 each W is independently -R, -X, =O, -OR, =S, -SR, -NRR, =NR, (C₁-C₆) perhaloalkyl, -CX₃, -CN, -OCN, -SCN, -NO, -NO₂, =N₂, -N₃, -NHOH, -S(O)₂R, -C(O)R, -C(S)R, -C(O)OR', -C(S)OR', -C(O)SR', -C(S)SR', and -C(NR)NRR, wherein:

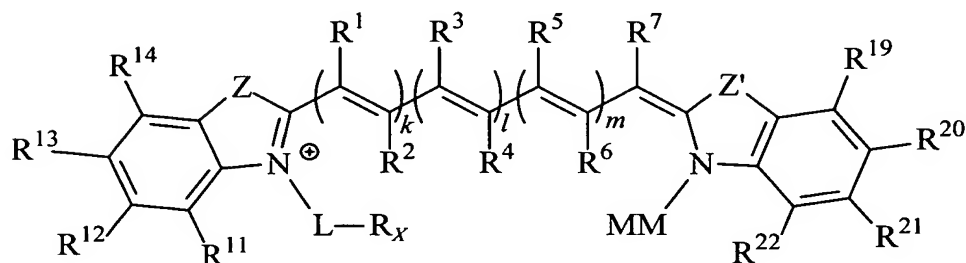
each X is independently a halogen;

20 each R is independently -H, -NRⁿRⁿ, -C(O)Rⁿ, -S(O₂)Rⁿ, (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkenyl, (C₂-C₆) alkynyl, (C₅-C₁₀) aryl, (C₆-C₁₆) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and

25 each R' is independently (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkenyl and (C₂-C₆) alkynyl, (C₅-C₁₀) aryl, (C₆-C₁₆) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and each Rⁿ is independently -H, (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkynyl, (C₅-C₁₀) aryl, (C₆-C₁₆) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl.

14. A mobility-modifying cyanine dye according to Claim 1 in which the first and second heteroaromatic benzazole/benzazolium rings are each the same or different substituted or unsubstituted indoline/indolinium ring.

15. The mobility-modifying cyanine dye of Claim 1 which has the structure:



or a salt thereof, wherein:

k , l , and m are each independently integers from 0 to 1;

R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and R^7 are each independently selected from the group consisting of hydrogen, halogen, $-F$, $-Cl$, $-CN$, $-CF_3$, (C_1-C_6) alkyl, (C_5-C_{14}) aryl and 5-14 membered heteroaryl;

MM is a mobility-modifying moiety;

L is a linker;

R_x is a reactive functional group;

Z is selected from the group consisting of $-S-$, $-O-$, $-Se-$ and $-CR^8R^9-$, where R^8 and R^9 when taken alone, are each independently (C_1-C_6) alkyl, or when taken together are (C_4-C_5) alkyleno or (C_4-C_5) alkano;

Z' is selected from the group consisting of $-S-$, $-O-$, $-Se-$ and $-CR^8R^9-$, where R^8 and R^9 , when taken alone, are each independently (C_1-C_6) alkyl, or when taken together are (C_4-C_5) alkyleno or (C_4-C_5) alkano;

R^{11} , R^{12} , R^{13} and R^{14} , when taken alone, are each independently selected from the group consisting of hydrogen, (C_1-C_6) alkyl, (C_1-C_6) alkyl independently substituted with one or more W, 2-6 membered heteroalkyl, 2-6 membered heteroalkyl independently substituted with one or more W, (C_5-C_{10}) aryl, (C_5-C_{10}) aryl independently substituted with one or more W, (C_5-C_6) arylaryl, (C_5-C_6) arylaryl independently

substituted with one or more W, (C₆-C₁₆) arylalkyl, (C₆-C₁₆) independently substituted with one or more W, 6-16 membered arylheteroalkyl, 6-16 membered arylheteroalkyl independently substituted with one or more W, 5-10 membered heteroaryl, 5-10 membered heteroaryl independently substituted with one or more W, 5-6 membered heteroaryl-heteroaryl, 5-6 membered heteroaryl independently substituted with one or more W, 6-16 membered heteroarylalkyl, 6-16 membered heteroarylalkyl independently substituted with one or more W, 6-16 membered heteroaryl-heteroalkyl and 6-16 membered heteroaryl-heteroalkyl independently substituted with one or more W,

or when taken together with an adjacent Rⁿ are each independently selected from the group consisting of (C₆-C₁₀) aryleno, (C₆-C₁₀) aryleno independently substituted with one or more W, 6-10 membered heteroaryleno and 6-10 membered heteroaryleno independently substituted with one or more W;

R¹⁹, R²⁰, R²¹ and R²², when taken alone, are each independently selected from the group consisting of hydrogen, (C₁-C₆) alkyl, (C₁-C₆) alkyl independently substituted with one or more W, 2-6 membered heteroalkyl, 2-6 membered heteroalkyl independently substituted with one or more W, (C₅-C₁₀) aryl, (C₅-C₁₀) aryl independently substituted with one or more W, (C₅-C₆) arylaryl, (C₅-C₆) arylaryl independently substituted with one or more W, (C₆-C₁₆) arylalkyl, (C₆-C₁₆) independently substituted with one or more W, 6-16 membered arylheteroalkyl, 6-16 membered arylheteroalkyl independently substituted with one or more W, 5-10 membered heteroaryl, 5-10 membered heteroaryl independently substituted with one or more W, 5-6 membered heteroaryl-heteroaryl, 5-6 membered heteroaryl independently substituted with one or more W, 6-16 membered heteroarylalkyl, 6-16 membered heteroarylalkyl independently substituted with one or more W, 6-16 membered heteroaryl-heteroalkyl and 6-16 membered heteroaryl-heteroalkyl independently substituted with one or more W,

or when taken together with an adjacent Rⁿ are each independently selected from the group consisting of (C₆-C₁₀) aryleno, (C₆-C₁₀) aryleno independently substituted with one or more W, 6-10 membered heteroaryleno and 6-10 membered heteroaryleno independently substituted with one or more W;

each W is independently -R, -X, =O, -OR, =S, -SR, -NRR, =NR, (C₁-C₆)

perhaloalkyl, $-CX_3$, $-CN$, $-OCN$, $-SCN$, $-NO$, $-NO_2$, $=N_2$, $-N_3$, $-NHOH$, $-S(O)_2R$, $-C(O)R$, $-C(S)R$, $-C(O)OR'$, $-C(S)OR'$, $-C(O)SR'$, $-C(S)SR'$, and $-C(NR)NRR$, wherein:

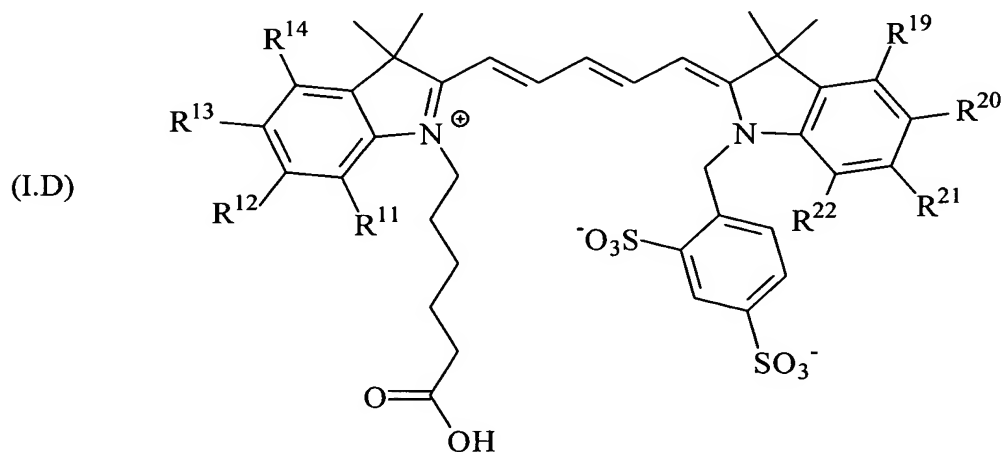
each X is independently a halogen;

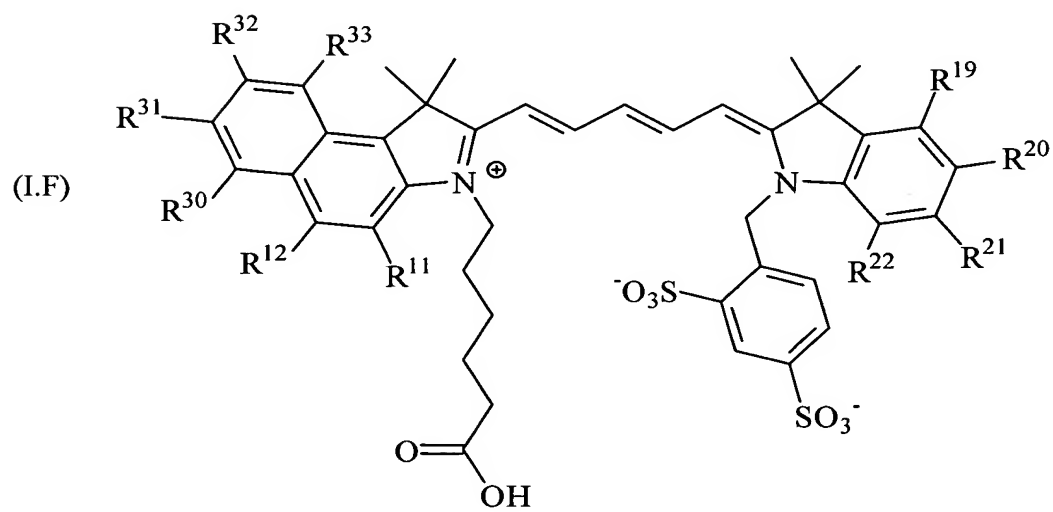
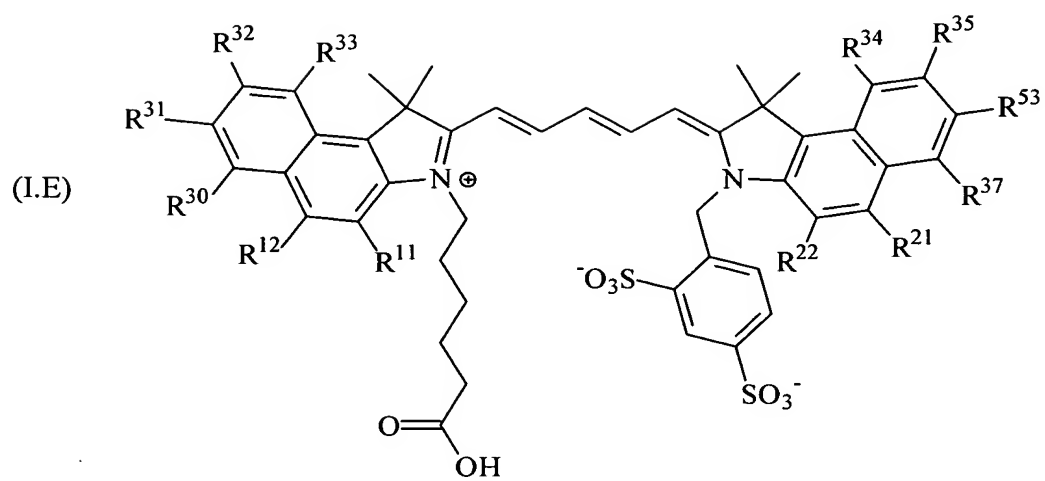
each R is independently $-H$, $-NR''R''$, $-C(O)R''$, $-S(O)_2R''$, (C_1-C_6) alkyl, (C_1-C_6) alkanyl, (C_2-C_6) alkenyl, (C_2-C_6) alkynyl, (C_5-C_{10}) aryl, (C_6-C_{16}) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and

each R' is independently (C_1-C_6) alkyl, (C_1-C_6) alkanyl, (C_2-C_6) alkenyl and (C_2-C_6) alkynyl, (C_5-C_{10}) aryl, (C_6-C_{16}) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and each R'' is independently $-H$, (C_1-C_6) alkyl, (C_1-C_6) alkanyl, (C_2-C_6) alkynyl, (C_5-C_{10}) aryl, (C_6-C_{16}) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl.

16. The mobility-modifying cyanine dye of Claim 15 in which Z is $-NR^8R^9-$, where R^8 and R^9 are each independently (C_1-C_6) alkano; and Z' is $-NR^8R^9-$, where R^8 and R^9 are each independently (C_1-C_6) alkano.

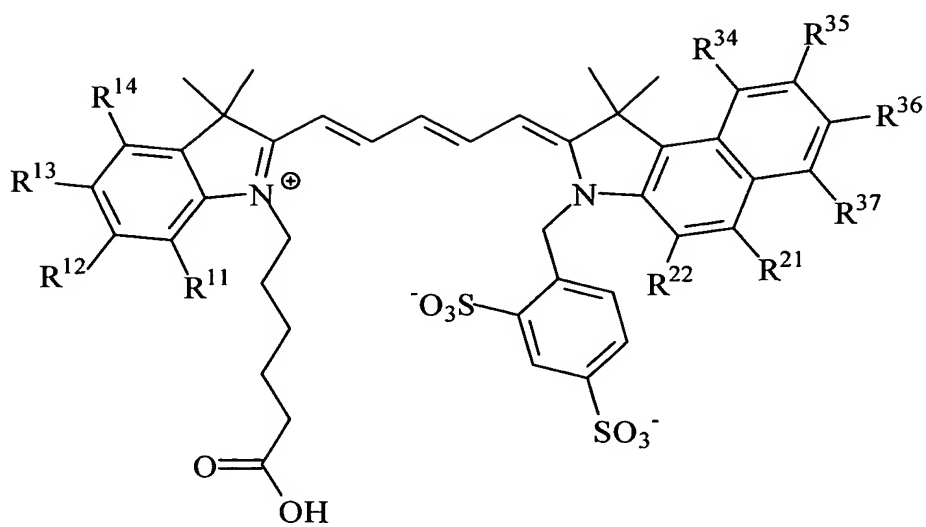
17. The mobility-modifying cyanine dye of Claim 15 which is selected from the group consisting of:



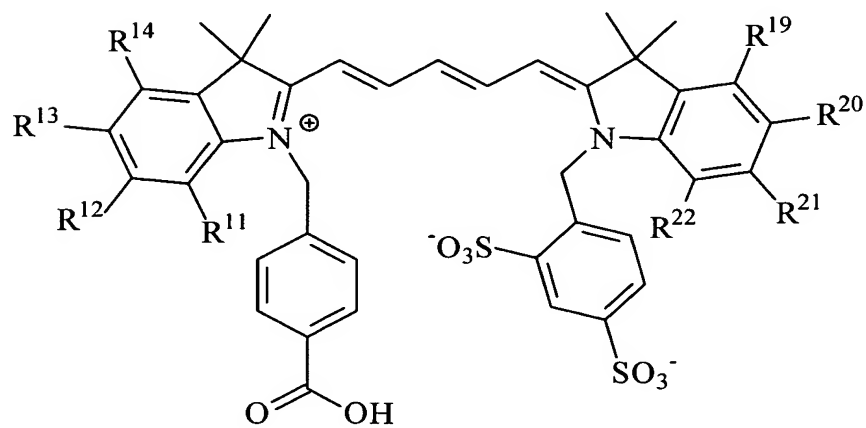


5

(I.G)

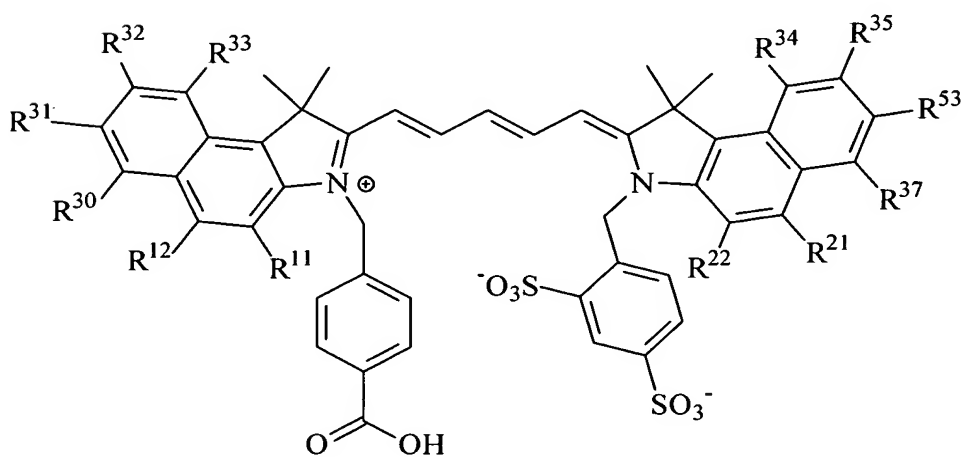


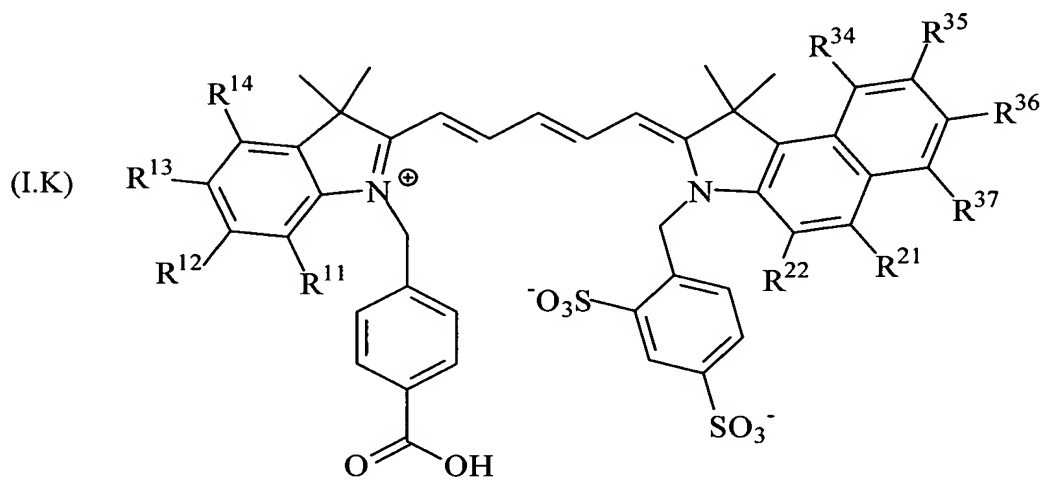
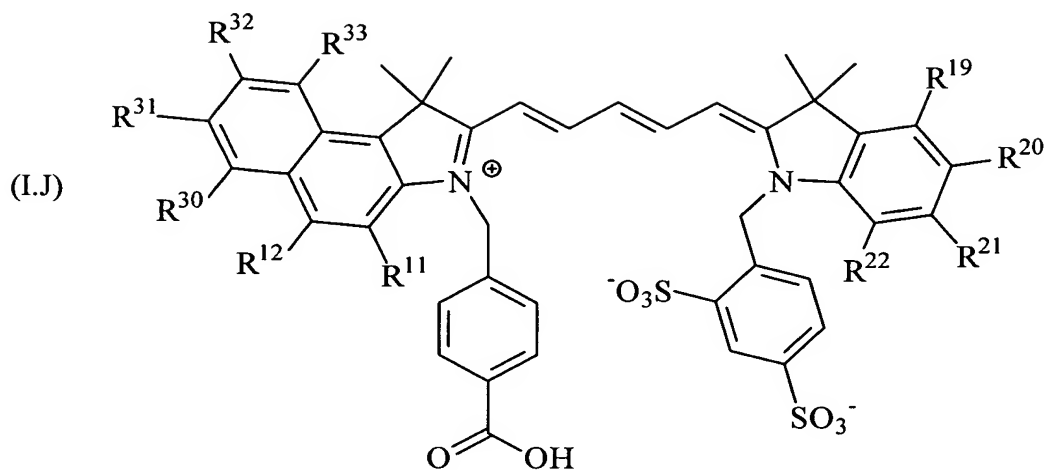
(I.H)



10

(I.I)



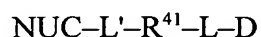


10

or a salt thereof, wherein:

R^{11} , R^{12} , R^{13} , R^{14} , R^{19} , R^{20} , R^{21} , R^{22} , R^{30} , R^{31} , R^{32} , R^{33} , R^{34} , R^{35} , R^{36} and R^{37} are each independently selected from the group consisting of hydrogen, $-S(O)_2O^-$ and $-O-S(O)_2O^-$.

18. A labeled nucleoside/tide or nucleoside/tide analog having the structure:



or a salt thereof, wherein:

D is a mobility-modifying cyanine dye chromophore;

L is a first linker which is attached to D at a heteroaromatic ring nitrogen;

R^{41} is a covalent linkage;

NUC is a nucleoside/tide or nucleoside/tide analog; and

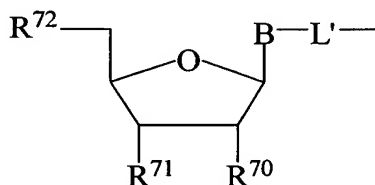
L' is a second linker which is attached to the nucleobase or sugar moiety of NUC.

19. The labeled nucleoside/tide or nucleoside/tide analog of Claim 18 which is enzymatically incorporable.

20. The labeled nucleoside/tide or nucleoside/tide analog of Claim 18 which is a terminator.

21. The labeled nucleoside/tide or nucleoside/tide analog of Claim 18 which is enzymatically extendable.

22. The labeled nucleoside/tide or nucleoside/tide analog of Claim 18 in which $-\text{L}'-\text{NUC}$ taken together has the structure:



or a salt thereof, wherein:

B is a nucleobase;

L' is (C₁-C₂₀) alkylidyl, (C₁-C₂₀) alkylene, (C₂-C₂₀) alkyno, (C₂-C₂₀) alkeno
2-20 membered heteroalkylidyl, 2-20 membered heteroalkylene, 2-20 membered
heteroalkyno or 2-20 membered heteroalkeno;

R⁷⁰ and R⁷¹, when taken alone, are each independently selected from the
group consisting of hydrogen, hydroxyl and a moiety which blocks polymerase-mediated
template-directed polymerization, or when taken together form a bond such that the
illustrated sugar is 2',3'-didehydroribose; and

R⁷² is selected from the group consisting of hydroxyl, a phosphate ester

having the formula $\text{---O} \left[\begin{array}{c} \text{O} \\ \parallel \\ \text{P} \\ \mid \\ \text{O}^- \end{array} \text{---O} \left[\begin{array}{c} \text{O} \\ \parallel \\ \text{P} \\ \mid \\ \text{O}^- \end{array} \text{---OH} \right]_a \right]_a$, where *a* is an integer from 0 to 2 and a

phosphate ester analog.

23. The labeled nucleoside/tide or nucleoside/tide analog of Claim 22 in which
L' is selected from the group consisting of:

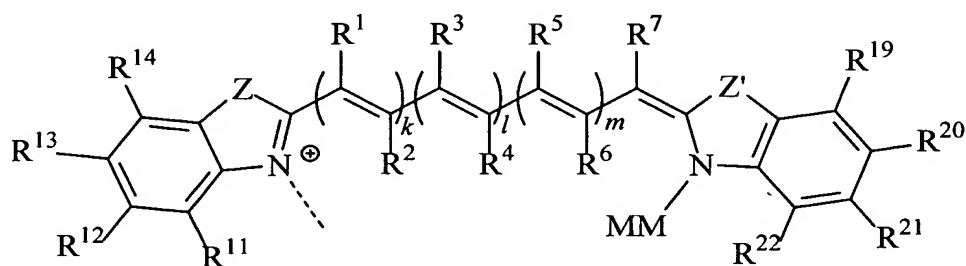
$\text{---C}\equiv\text{C---CH}_2\text{---}$, where the terminal *sp* carbon is covalently attached to
nucleobase B and the terminal methylene (*sp*³) carbon is covalently attached to R⁴¹; and
 $\text{---C}\equiv\text{C---CH}_2\text{---O---CH}_2\text{---CH}_2\text{---NR}^{47}\text{---R}^{48}\text{---}$, where R⁴⁷ is hydrogen or (C₁-C₆)
alkyl and R⁴⁸ is $\text{---C(O)---(CH}_2\text{)}_r\text{---}$, $\text{---C(O)---CHR}^{49}\text{---}$, $\text{---C(O)---C}\equiv\text{C---CH}_2\text{---}$ or $\text{---C(O)---}\phi\text{---(CH}_2\text{)}_r\text{---}$,
where each *r* is independently an integer from 1 to 5 and ϕ is C₆ arylidyl or 6-membered
heteroarylidyl and R⁴⁹ is hydrogen, (C₁-C₆) alkyl or a side chain of an encoding or non-
encoding amino acid, and where the terminal *sp* carbon is covalently attached to
nucleobase B and the other terminal group is covalently attached to R⁴¹.

24. The labeled nucleoside/tide or nucleoside/tide analog of Claim 22 in which
nucleobase B is a purine, a 7-deazapurine, a pyrimidine, a normal nucleobase or a common

analog of a normal nucleobase.

25. The labeled nucleoside/tide or nucleoside/tide analog of Claim 18 in which D has the structure:

5



or a salt thereof, wherein:

10

k , l , and m are each independently integers from 0 to 1;

R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and R^7 are each independently selected from the group consisting of hydrogen, halogen, $-F$, $-Cl$, $-CN$, $-CF_3$, (C_1-C_6) alkyl, (C_5-C_{14}) aryl or 5-14 membered heteroaryl;

MM is a mobility-modifying moiety;

15

Z is selected from the group consisting of $-S-$, $-O-$, $-Se-$ and $-CR^8R^9-$, where R^8 and R^9 when taken alone, are each independently (C_1-C_6) alkyl, or when taken together are (C_4-C_5) alkyleno or (C_4-C_5) alkano;

Z' is selected from the group consisting of $-S-$, $-O-$, $-Se-$ and $-CR^8R^9-$, where R^8 and R^9 , when taken alone, are each independently (C_1-C_6) alkyl, or when taken together are (C_4-C_5) alkyleno or (C_4-C_5) alkano;

20

R^{11} , R^{12} , R^{13} and R^{14} , when taken alone, are each independently selected from the group consisting of hydrogen, (C_1-C_6) alkyl, (C_1-C_6) alkyl independently substituted with one or more W, 2-6 membered heteroalkyl, 2-6 membered heteroalkyl independently substituted with one or more W, (C_5-C_{10}) aryl, (C_5-C_{10}) aryl independently

substituted with one or more W, (C₅-C₆) arylaryl, (C₅-C₆) arylaryl independently
substituted with one or more W, (C₆-C₁₆) arylalkyl, (C₆-C₁₆) independently substituted with
one or more W, 6-16 membered arylheteroalkyl, 6-16 membered arylheteroalkyl
independently substituted with one or more W, 5-10 membered heteroaryl, 5-10 membered
5 heteroaryl independently substituted with one or more W, 5-6 membered heteroaryl-
heteroaryl, 5-6 membered heteroaryl independently substituted with one or more W, 6-16
membered heteroarylalkyl, 6-16 membered heteroarylalkyl independently substituted with
one or more W, 6-16 membered heteroaryl-heteroalkyl and 6-16 membered heteroaryl-
heteroalkyl independently substituted with one or more W,

10 or when taken together with an adjacent Rⁿ are each independently selected
from the group consisting of (C₆-C₁₀) aryleno, (C₆-C₁₀) aryleno independently substituted
with one or more W, 6-10 membered heteroaryleno and 6-10 membered heteroaryleno
independently substituted with one or more W;

R¹⁹, R²⁰, R²¹ and R²², when taken alone, are each independently selected
15 from the group consisting of hydrogen, (C₁-C₆) alkyl, (C₁-C₆) alkyl independently
substituted with one or more W, 2-6 membered heteroalkyl, 2-6 membered heteroalkyl
independently substituted with one or more W, (C₅-C₁₀) aryl, (C₅-C₁₀) aryl independently
substituted with one or more W, (C₅-C₆) arylaryl, (C₅-C₆) arylaryl independently
substituted with one or more W, (C₆-C₁₆) arylalkyl, (C₆-C₁₆) independently substituted with
20 one or more W, 6-16 membered arylheteroalkyl, 6-16 membered arylheteroalkyl
independently substituted with one or more W, 5-10 membered heteroaryl, 5-10 membered
heteroaryl independently substituted with one or more W, 5-6 membered heteroaryl-
heteroaryl, 5-6 membered heteroaryl independently substituted with one or more W, 6-16
membered heteroarylalkyl, 6-16 membered heteroarylalkyl independently substituted with
25 one or more W, 6-16 membered heteroaryl-heteroalkyl and 6-16 membered heteroaryl-
heteroalkyl independently substituted with one or more W,

or when taken together with an adjacent Rⁿ are each independently selected
from the group consisting of (C₆-C₁₀) aryleno, (C₆-C₁₀) aryleno independently substituted
with one or more W, 6-10 membered heteroaryleno and 6-10 membered heteroaryleno
30 independently substituted with one or more W;

each W is independently -R, -X, =O, -OR, =S, -SR, -NRR, =NR, (C₁-C₆) perhaloalkyl, -CX₃, -CN, -OCN, -SCN, -NO, -NO₂, =N₂, -N₃, -NHOH, -S(O)₂R, -C(O)R, -C(S)R, -C(O)OR', -C(S)OR', -C(O)SR', -C(S)SR', and -C(NR)NRR, wherein:

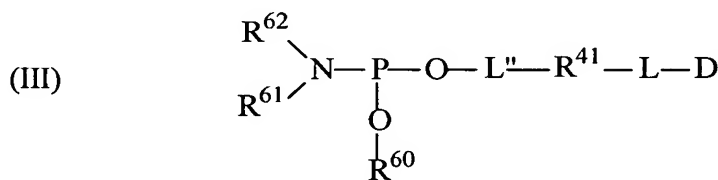
each X is independently a halogen;

each R is independently -H, -NR''R'', -C(O)R'', -S(O)₂R'', (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkenyl, (C₂-C₆) alkynyl, (C₅-C₁₀) aryl, (C₆-C₁₆) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl;

each R' is independently (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkenyl and (C₂-C₆) alkynyl, (C₅-C₁₀) aryl, (C₆-C₁₆) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and each R'' is independently -H, (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkynyl, (C₅-C₁₀) aryl, (C₆-C₁₆) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and

the dotted line at the heteroaromatic ring nitrogen indicates the point of attachment of linker L.

26. A mobility-modifying phosphoramidite reagent having the structure:



or a salt thereof, wherein:

N, O and P are nitrogen, oxygen and phosphorous, respectively;

D is a mobility-modifying dye chromophore or a protected derivative thereof;

L is a first linker;

R⁴¹ is a bond or a covalent linkage;

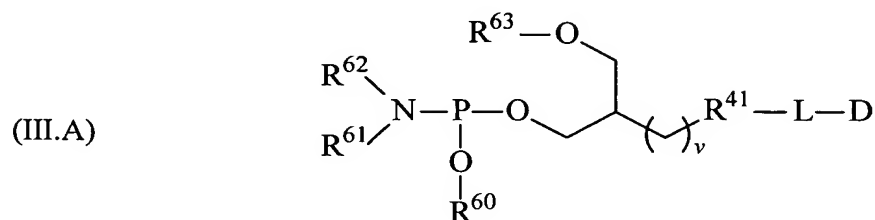
L'' is a bond or a second linker;

R^{60} is a phosphite ester protecting group;

R^{61} , when taken alone, is selected from the group consisting of (C_1-C_6) alkyl, (C_1-C_6) alkanyl, (C_2-C_6) alkenyl, (C_2-C_6) alkynyl, (C_3-C_{10}) cycloalkyl, (C_5-C_{20}) aryl and (C_6-C_{26}) arylalkyl, or when taken together with R^{62} forms a straight-chain or branched (C_2-C_{10}) alkylene or a straight-chain or branched 2-10 membered heteroalkylene; and

R^{62} , when taken alone, is selected from the group consisting of (C_1-C_6) alkyl, (C_1-C_6) alkanyl, (C_2-C_6) alkenyl, (C_2-C_6) alkynyl, (C_3-C_{10}) cycloalkyl, (C_5-C_{20}) aryl and (C_6-C_{26}) arylalkyl, or when taken together with R^{61} forms a straight-chain or branched (C_2-C_{10}) alkylene or a straight-chain or branched 2-10 membered heteroalkylene.

27. The mobility-modifying phosphoramidite reagent according to Claim 26 which has the structure:



wherein:

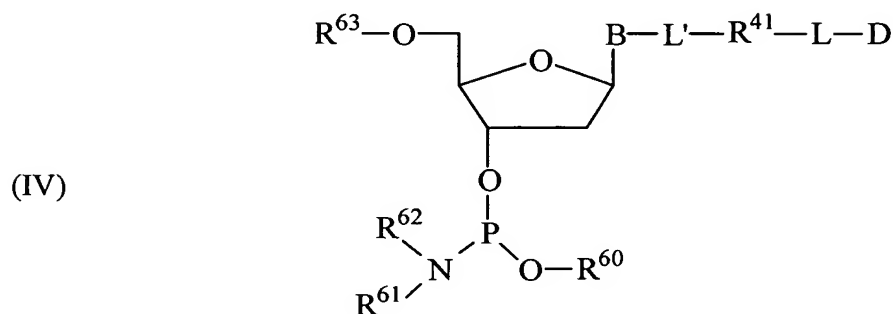
N, P and O are nitrogen, phosphorous and oxygen, respectively;

R^{41} , L, D, R^{60} , R^{61} and R^{62} are as previously defined;

R^{63} is hydrogen or an acid-labile hydroxyl protecting group; and

v is an integer from 1 to 30.

28. A mobility-modifying phosphoramidite reagent having the structure:



or a salt thereof, wherein:

O, P and N are oxygen, phosphorous and nitrogen, respectively;

B is a nucleobase or a protected derivative thereof;

D is a mobility-modifying dye chromophore or a protected derivative thereof;

L is a first linker which is attached to D at a heteroaromatic ring nitrogen;

R⁴¹ is a bond or a covalent linkage;

L' is a bond or a second linker;

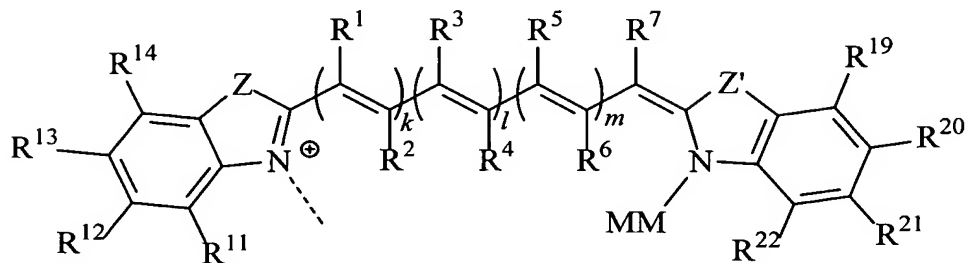
R⁶⁰ is a phosphite ester protecting group;

R⁶¹, when taken alone, is selected from the group consisting of (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkenyl, (C₂-C₆) alkynyl, (C₃-C₁₀) cycloalkyl, (C₅-C₂₀) aryl and (C₆-C₂₆) arylalkyl, or when taken together with R⁶² forms a straight-chain or branched (C₂-C₁₀) alkyleno or a straight-chain or branched 2-10 membered heteroalkyleno; and

R⁶², when taken alone, is selected from the group consisting of (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkenyl, (C₂-C₆) alkynyl, (C₃-C₁₀) cycloalkyl, (C₅-C₂₀) aryl and (C₆-C₂₆) arylalkyl, or when taken together with R⁶¹ forms a straight-chain or branched (C₂-C₁₀) alkyleno or a straight-chain or branched 2-10 membered heteroalkyleno; and

R⁶³ is hydrogen or an acid-labile hydroxyl protecting group

29. The mobility-modifying phosphoramidite reagent according to Claim 26, 27 or 28 in which D has the structure:



or a salt thereof, wherein:

k , l , and m are each independently integers from 0 to 1;

R^1 , R^2 , R^3 , R^4 , R^5 , R^6 and R^7 are each independently selected from the group consisting of hydrogen, halogen, $-F$, $-Cl$, $-CN$, $-CF_3$, (C_1-C_6) alkyl, (C_5-C_{14}) aryl or 5-14 membered heteroaryl;

MM is a mobility-modifying moiety;

Z is selected from the group consisting of $-S-$, $-O-$, $-Se-$ and $-CR^8R^9-$, where R^8 and R^9 when taken alone, are each independently (C_1-C_6) alkyl, or when taken together are (C_4-C_5) alkyleno or (C_4-C_5) alkano;

Z' is selected from the group consisting of $-S-$, $-O-$, $-Se-$ and $-CR^8R^9-$, where R^8 and R^9 , when taken alone, are each independently (C_1-C_6) alkyl, or when taken together are (C_4-C_5) alkyleno or (C_4-C_5) alkano;

R^{11} , R^{12} , R^{13} and R^{14} , when taken alone, are each independently selected from the group consisting of hydrogen, (C_1-C_6) alkyl, (C_1-C_6) alkyl independently substituted with one or more W, 2-6 membered heteroalkyl, 2-6 membered heteroalkyl independently substituted with one or more W, (C_5-C_{10}) aryl, (C_5-C_{10}) aryl independently substituted with one or more W, (C_5-C_6) arylaryl, (C_5-C_6) arylaryl independently substituted with one or more W, (C_6-C_{16}) arylalkyl, (C_6-C_{16}) independently substituted with

one or more W, 6-16 membered arylheteroalkyl, 6-16 membered arylheteroalkyl
independently substituted with one or more W, 5-10 membered heteroaryl, 5-10 membered
heteroaryl independently substituted with one or more W, 5-6 membered heteroaryl-
heteroaryl, 5-6 membered heteroaryl independently substituted with one or more W, 6-16
5 membered heteroarylalkyl, 6-16 membered heteroarylalkyl independently substituted with
one or more W, 6-16 membered heteroaryl-heteroalkyl and 6-16 membered heteroaryl-
heteroalkyl independently substituted with one or more W,

or when taken together with an adjacent Rⁿ are each independently selected
from the group consisting of (C₆-C₁₀) aryleno, (C₆-C₁₀) aryleno independently substituted
10 with one or more W, 6-10 membered heteroaryleno and 6-10 membered heteroaryleno
independently substituted with one or more W;

R¹⁹, R²⁰, R²¹ and R²², when taken alone, are each independently selected
from the group consisting of hydrogen, (C₁-C₆) alkyl, (C₁-C₆) alkyl independently
substituted with one or more W, 2-6 membered heteroalkyl, 2-6 membered heteroalkyl
15 independently substituted with one or more W, (C₅-C₁₀) aryl, (C₅-C₁₀) aryl independently
substituted with one or more W, (C₅-C₆) arylaryl, (C₅-C₆) arylaryl independently
substituted with one or more W, (C₆-C₁₆) arylalkyl, (C₆-C₁₆) independently substituted with
one or more W, 6-16 membered arylheteroalkyl, 6-16 membered arylheteroalkyl
independently substituted with one or more W, 5-10 membered heteroaryl, 5-10 membered
20 heteroaryl independently substituted with one or more W, 5-6 membered heteroaryl-
heteroaryl, 5-6 membered heteroaryl independently substituted with one or more W, 6-16
membered heteroarylalkyl, 6-16 membered heteroarylalkyl independently substituted with
one or more W, 6-16 membered heteroaryl-heteroalkyl and 6-16 membered heteroaryl-
heteroalkyl independently substituted with one or more W,

or when taken together with an adjacent Rⁿ are each independently selected
from the group consisting of (C₆-C₁₀) aryleno, (C₆-C₁₀) aryleno independently substituted
with one or more W, 6-10 membered heteroaryleno and 6-10 membered heteroaryleno
independently substituted with one or more W;

each W is independently -R, -X, =O, -OR, =S, -SR, -NRR, =NR, (C₁-C₆)
30 perhaloalkyl, -CX₃, -CN, -OCN, -SCN, -NO, -NO₂, =N₂, -N₃, -NHOH, -S(O)₂R, -C(O)R,

-C(S)R, -C(O)OR', -C(S)OR', -C(O)SR', -C(S)SR', and -C(NR)NRR, wherein:

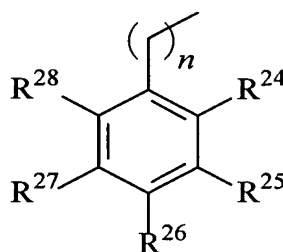
each X is independently a halogen;

each R is independently -H, -NR"R", -C(O)R", -S(O₂)R", (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkenyl, (C₂-C₆) alkynyl, (C₅-C₁₀) aryl, (C₆-C₁₆) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl;

each R' is independently (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkenyl and (C₂-C₆) alkynyl, (C₅-C₁₀) aryl, (C₆-C₁₆) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and each R" is independently -H, (C₁-C₆) alkyl, (C₁-C₆) alkanyl, (C₂-C₆) alkynyl, (C₅-C₁₀) aryl, (C₆-C₁₆) arylalkyl, 5-10 membered heteroaryl or 6-16 membered heteroarylalkyl; and

the dotted line at the heteroaromatic ring nitrogen indicates the point of attachment of linker L.

30. The mobility-modifying phosphoramidite reagent of Claim 29 in which MM has the structure:



or a salt thereof, wherein:

n is an integer from 1 to 6 (preferably 1 to 3);

R²⁴, when taken alone, is hydrogen, a strong anionic substituent, -S(O)₂O⁻, or -O-S(O)₂O⁻, or when taken together with R²⁵ is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, -S(O)₂O⁻, or -O-S(O)₂O⁻ groups;

R^{25} , when taken alone, is hydrogen, a strong anionic substituent, $-S(O)_2O^-$, or $-O-S(O)_2O^-$, or when taken together with R^{24} or R^{26} is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, $-S(O)_2O^-$, or $-O-S(O)_2O^-$ groups;

5 R^{26} , when taken alone, is hydrogen, a strong anionic substituent, $-S(O)_2O^-$, or $-O-S(O)_2O^-$, or when taken together with R^{25} or R^{27} is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, $-S(O)_2O^-$, or $-O-S(O)_2O^-$ groups; and

10 R^{27} , when taken alone, is hydrogen, a strong anionic substituent, $-S(O)_2O^-$, or $-O-S(O)_2O^-$, or when taken together with R^{26} or R^{28} is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, $-S(O)_2O^-$, or $-O-S(O)_2O^-$ groups; and

15 R^{28} , when taken alone, is hydrogen, a strong anionic substituent, $-S(O)_2O^-$, or $-O-S(O)_2O^-$, or when taken together with R^{27} is a benzo group or a benzo group independently substituted with one or more strong anionic substituents, $-S(O)_2O^-$, or $-O-S(O)_2O^-$ groups.

20 31. The mobility-modifying phosphoramidite reagent according to Claim 26, 27 or 28 in which L is $-CH_2-CH_2-CH_2-CH_2-CH_2-$ (pentano).

32. The mobility-modifying phosphoramidite reagent according to Claim 26, 27 or 28 in which R^{41} is a covalent linkage formed upon the reaction between an electrophile and a nucleophile.

25 33. The mobility-modifying phosphoramidite reagent according to Claim 31 in which R^{41} has the structure $-C(O)-NR^{56}-$, where R^{56} is hydrogen or (C_1-C_6) alkyl.

30 34. A polynucleotide labeled with a mobility-modifying dye according to Claim 1.

35. A method of generating a labeled primer extension product, comprising the step of enzymatically extending a primer-target hybrid in the presence of a mixture of enzymatically-extendable nucleotides capable of supporting continuous primer extension and a terminator, wherein said primer or said terminator is labeled with a mobility-modifying dye according to Claim 1.

36. The method of Claim 35 in which the terminator is a mixture of four different terminators, one which terminates at a template A, one which terminates at a template G, one which terminates at a template C and one which terminates at a template T or U and wherein at least one of the terminators is labeled with a mobility-modifying dye according to Claim 1.

37. The method of Claim 36 in which each of the four different terminators is labeled with a different, spectrally-resolvable fluorophore, and one of the terminators is selected from the group consisting of Compound 29 and Compound 32.

38. A kit for generating a labeled primer extension product, comprising enzymatically-extendable nucleotides capable of supporting continuous primer extension and a terminator, wherein said primer or said terminator is labeled with a mobility-modifying cyanine dye according to Claim 1.

39. The kit of Claim 38 in which the terminator is a set of four different mobility-modified terminators, one which terminates at a template A, one which terminates at a template G, one which terminates at a template C and one which terminates at a template T or U.

40. The kit of Claim 39 in which the set of four different terminators is a set of mobility-matched terminators.

41. The kit of Claim 39 in which the set of mobility-matched terminators

comprises Compounds **31, 32, 33** and **34**.